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DISTRIBUTION OF *MERETRIX CASTA* (CHEMNITZ) IN VELLAR ESTUARY

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ABSTRACT

Meretrix casta (Chemnitz) occurring in three stations of Vellar Estuary at Parangipettai (S. India) was studied from April '75 to June '76 and at station I, the maximum number of 1077 clams/m² occurred in June '75 while the maximum was in May '75 at stations II and III which recorded respectively, 1312 and 1104 clams/m². Minimum number of 11 clams/m² was recorded in September '75 and February '76 at station I while the minimum number of clams occurred in March '76 at stations II and III which recorded 80 and 5 clams/m² respectively.

Highest biomass values by weight were 2978.773 gm/m² for 768 clams in August '75 at station I, 3919.067 gm/m² for 693 clams in December '75 at station II and 628.907 gm/m² for 389 clams in September '75 at station III. Lowest biomass values recorded were 2.053 gm/m² for 571 clams in station I, 6.635 gm/m² for 1109 clams at station II and 0.949 gm/m² for 405 clams at station III.

Clam population in station II was always more than in station I and III. Sediment analysis revealed that station I was sandy and station II was sandy-silt while station II was sandy-silt-clay with an increase in silt clay contents.

INTRODUCTION

PHYSICAL, chemical and biological factors like substratum, temperature, salinity, oxygen, food availability, predators, etc. are the important factors which influence the distribution of animals in the sea and in the estuaries. Thorson (1966) stated that the environmental factors like temperature, salinity, oxygen, turbidity, etc. collectively influence the distribution of benthic animal communities, while Sanders (1956, 1958), Redding and Cory (1975), Kurian *et al.* (1975) and Murugan *et al.* (1980) reported that sediment characteristics greatly influenced the distribution of benthic animals.

MATERIAL AND METHODS

In the present investigations, biomass studies were carried out monthly, for a total of fifteen months from April 1975 to June 1976, in clam beds from three different areas to determine the factors influencing the distribution of the clam *Meretrix casta* (Chemnitz) in the Vellar Estuary (Lat. 11°29' N and Long. 79°46' E). Station I is situated near the mouth of the Vellar Estuary in the marine zone. Station II, about 2 km upstream from station I, is situated just opposite the jetty, in the gradient zone. Station III is about 3.8 km upstream from station II, near the railway bridge, in the tidal zone.

Petersen type of dredge was used for collection of bottom samples. The bottom samples were washed through 0.5 mm square mesh sieve. The clams retained in the sieve were collected and preserved in 5% neutral formalin. Three such samples were collected in each area and later, they were counted and measured in the laboratory to get the numerical and quantitative values.

The sediment samples were taken from each station and dried in the oven. The dried

samples were subjected to grade analysis as outlined by Krumbein and Pettijohn (1938). The texture of sediment was ascertained by plotting the values on a textural triangle deviced by U. S. Department of Agriculture (Anon., 1951).

Results

Monthly biomass values at three stations are given in Table 1. When the local demand increased for clam shell for use in kilns to produce lime (a substitute for cement in rural areas), clam picking was resorted to in the Vellar Estuary. Thus, clam picking was intensive during August 1975 at station I, in February 1976 at station II and in September 1975 at station III. The clam populations after that decreased considerably and collections made during subsequent months showed lower biomass values per sq. metre at each station.

Comparing the biomass values of the three stations from April '75 to August '75 *i.e.* before clam picking, an increase in their number could be observed within one or two months from initial values recorded in April '75 and the increase was due to additional recruitment (by spat settlement) during these months. At station I, the maximum number of 1077/m² clams occurred in June '75 while the maximum was in May '75 at stations II and III, which recorded 1312 and 1104 clams/m² respectively. Collections made during subsequent months (*viz.* June, July and August '75) at three stations, revealed a slight reduction in their number, probably due to clam picking, natural mortality and predation in addition to lesser settlement of spat because of disturbance of the substratum during clam picking.

Due to clam picking, especially station I and III recorded very low biomass values per square metre. At station I, 768 clams/m² were recorded in August '75 and it went down to 11 clams/m² in September '75. Similarly at station III, 389 clams/m² were recorded in

Table 1. *Biomass number, weight and size range per square metre in three stations at the Vellar Estuary*

Month	Station I			Station II			Station III		
	No/m²	Weight gm/m²	Size range mm	No/m²	Weight gm/m²	Size range mm	No/m²	Weight gm/m²	Size range mm
April, 1975	987	8.288	1.8- 3.9	1109	6.635	1.4- 4.0	347	1.099	1.4- 2.3
May	779	178.864	5.8-10.8	1312	214.480	5.0-11.2	1104	8.571	1.4- 4.0
June	1077	705.733	9.0-15.2	1003	481.760	9.2-15.0	869	41.424	3.2- 8.6
July	800	1582.507	13.2-20.3	699	779.893	12.0-19.0	725	265.733	6.2-13.2
August	768	2978.773	17.0-24.5	656	1563.973	14.5-22.0	624	298.693	7.1-15.0
September	11	82.219	26.1-26.6	603	2418.853	17.2-25.1	389	628.907	11.7-19.6
October	16	152.960	27.5-28.2	688	3082.773	17.2-27.1	37	153.227	20.1-21.6
November	21	213.669	28.7-29.6	640	3311.147	18.4-27.7	16	91.87	24.2
December	16	196.800	30.6-30.8	693	3919.067	19.2-28.0	37	280.880	26.1-26.7
January, 1976	16	216.384	31.0-32.6	501	3842.747	23.1-31.9	11	87.013	27.4
February	11	166.693	33.1-34.1	373	3468.080	25.3-32.4	27	277.387	29.1-29.7
March	571	2.053	1.4- 2.7	80	1055.067	30.1-32.5	5	73.335	31.6
April	811	74.763	3.2- 8.5	1019	336.757	1.4-33.4	405	0.949	1.4- 2.3
May	709	125.280	6.2-10.1	923	123.840	5.0-10.4	672	15.259	2.0- 6.5
June	437	239.893	10.1-14.1	907	366.453	6.5-14.0	576	89.547	5.0-10.1

September '75, and it decresed to 37 clams/m² in October. Station II was not affected because, the clam picking was done much later, but here also the values declined after picking, from 373 clams/m² in February '76 to 80 clams/m² in March '76. Later, the number increased due to new settlement of spat at stations II and III in April '76, whereas at station I, the new spat settlement occurred in March '76. Thus, due to new spat settlement, the biomass values increased to 571 clams/m² at station I, 1109 clams/m² at station II and 405 clam/m² at station III either in March or April '76.

Biomass values by weight, at three stations, showed much variation which can be attributed to the difference in number and to the difference in the size groups present in the collections. The variation may also be attributed to cumulative effect of initial settlement at these stations, to the mortality and different rates of growth in different size groups during different seasons. Hence in the present study, variations in biomass values by weight were recorded in all three stations during different months as given below : highest biomass values were 2978.773 gm/m² for 768 clams in August '75 at station I, 3919.067 gm/m² for 693 clams in December '75 at station II and 628.907 gm/m² for 389 clams in September '75 at station III. Lowest biomass values recorded were 2.053 gm/m² for 571 clams in station I, 6.635 gm/m² for 1109 clams in station II and 0.949 gm/m² for 405 clams in station III. High number and low weight values can be attributed to the large settlement of small clams (spat) which later declined due to natural mortality.

Monthly sediment analysis of the bottom samples collected from three stations are given in Table 2. In station I, the sediment analysis showed that the sand ranged from 76.12 to 88.72%, silt from 7.12% to 17.60% and clay from 0.68% to 8.88%. It comes under the category sandy, according to the classification of sediment type. In station II, the sediment analysis showed that the sand ranged from 59.68% to 71.92%, silt from 12.36% to 23.0% and clay from 10.32% to 20.76% and the

TABLE 2. *Monthly percentage of sand, silt and clay of sediments in the three stations of the Vellar Estuary*

Month	Station I			Station II			Station III		
	Sand	Silt	Clay	Sand	Silt	Clay	Sand	Silt	Clay
April 1975	86.12	11.56	2.32	71.92	12.36	15.72	57.36	20.16	22.48
May	88.72	10.60	0.68	70.48	15.24	14.28	54.24	21.00	24.40
June	86.04	12.36	1.60	62.76	16.48	20.76	54.40	19.72	25.88
July	85.80	10.08	4.12	66.44	14.56	19.00	52.68	22.56	24.76
August	87.52	9.84	2.64	62.48	22.20	15.32	56.72	23.16	20.12
September	86.60	10.00	3.40	66.48	21.36	12.16	54.48	18.04	27.16
October	76.12	17.60	6.28	59.68	20.12	20.20	39.32	29.12	31.56
November	87.24	7.12	5.64	61.44	18.40	20.16	48.20	20.80	31.00
December	84.20	11.68	4.12	61.48	20.40	18.12	46.12	21.00	32.88
January 1976	87.24	9.16	3.60	66.44	18.56	15.00	45.80	21.04	33.16
February	81.00	10.12	8.88	65.72	22.32	11.96	49.08	22.20	28.72
March	86.20	12.24	1.56	63.36	18.72	17.92	53.44	22.52	24.04
April	88.72	10.08	1.20	66.68	23.00	10.32	52.76	24.12	23.12
May	87.32	10.16	2.52	65.88	18.40	15.72	54.48	23.54	22.08
June	83.20	13.00	3.80	65.80	19.68	14.52	53.76	22.40	23.84

sediment type is sandy-silt. In station III, the sediment analysis showed that the sand ranged from 39.32% to 57.36%, silt from 18.0% to 24.12% and clay from 20.12% to 32.88% with the sediment type coming under the category of sandy-silt-clay. In conclusion, it is seen that the clay present in the substratum of station I is much less when compared to station III, whereas in station II, the clay was more than in station I, but lesser than in station III. Silt and clay showed an inverse relationship to sand at all three stations.

Discussion

Thorson (1966) reported that the environmental factors like temperature, salinity, oxygen, etc. influenced the distribution of benthos in Danish (temperate) waters while Sanders (1958) considered that sediment 'characteristics' (*i.e.* sand grain size and clay content) greatly influenced the distribution of various benthic organisms in Buzzards Bay, U.S.A. In India, Kurian *et al.* (1975) working in Vembanad Lake, Parulekar *et al.* (1975) working in Mandovi and Zuari Estuaries and Murugan *et al.* (1980) working in Veli Lake, reported that the sediments influenced the distribution of benthic animals in estuaries and backwaters. Monthly collections made from April 1975 to June 1976 in three different stations of the Vellar Estuary in the present study revealed that sediments influenced the distribution and abundance of *Meretrix casta* in Vellar Estuary as below: When all values for different months are pooled, the monthly average is 469 clams/m² for station I, 747 clams/m² for station II and 389 clams/m² for station III. The above figures can be biased one due to delay in spat settlement for the year 1976. So, omitting 7 months data from September '75 to March '76, the monthly average calculated for the other 8 months comes to 795 clams/m² for station I, 954 clam/m² for station II and 665 clam/m² at station III. Then again considering the first 5 months from April 1975 to August 1975 (the period before clam picking) the monthly average recorded in 882 clams/m² at station I, 956 clams/m² at station II and 534 clams/m² at station III. Obviously, the clam population in station II was always more than in stations I and III. Sediment analysis revealed that station I is sandy and station II is sandy-silt while station III is sandy-silt-clay with an increase in silt and clay content. Thus, sandy-silt substratum seems to be preferred more by *M. casta* in the Vellar Estuary.

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